Genetic mapping of broad-spectrum QTLs and strain-specific major QTL for resistance to *Ralstonia solanacearum* in eggplant using GBS

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Introduction

- The bacteria, *R. solanacearum,* causes wilting on a wide range of crops including tomato, pepper, potato and eggplant.
- Major problem in tropical and subtropical areas.
- *R. solanacearum* species complex divided in phylotypes: I, IIA, IIB, III and IV.
- Strains from all phylotypes can wilt eggplant.
- Scarcity of resistance's sources in cultivated species. Locus *ERs1* in eggplant controls three strains of phylotype I [1].

Objectives

❶ Fine mapping of *ERs1* using Genotyping By Sequencing (GBS)

❷ Efficiency of *ERs1* facing strains belonging to phylotypes I, IIA, IIB and III

Materials & Methods

E8 (MM738) susceptible (S) X E6 (AG91-25) resistant (R)

↓

188 recombinant inbred lines (RILs)

Phenotyping with strains of phylotypes I, IIA, IIB and III

GBS with ApeKI enzyme

TTCCTGAACTGCATGAATGCTCAATCCTGCATCGGGGC
GCTTACAGCATGAATGCTCAATCCTGCATCGGGGCTCA
ATCGTACTGCTCGGATCGATTAGCCATGCGATCCAGTC
ACAAACAGCGTAGGTAACGTAAGCTTAGCAATCGATAGC
BARCODE ApeKI restriction site INSERTION (≈ 90 bp)

↓

Data analysis with Stacks pipeline [2]

↓

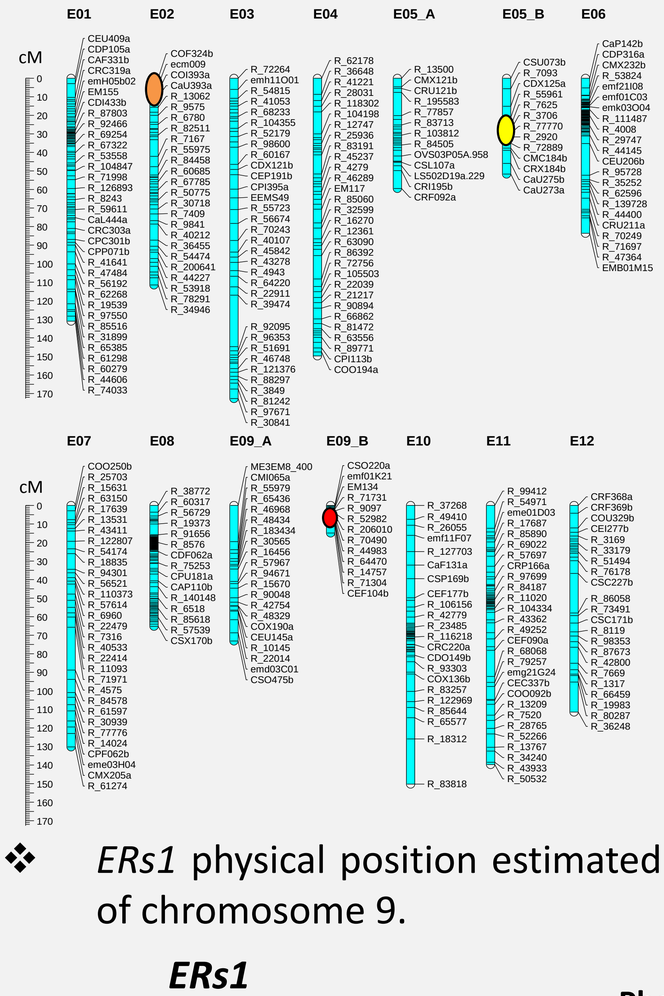
Genetic map with JoinMap 4.1 [3]

Phenotypic data analysis

QTL analysis with R/qtl package [4]

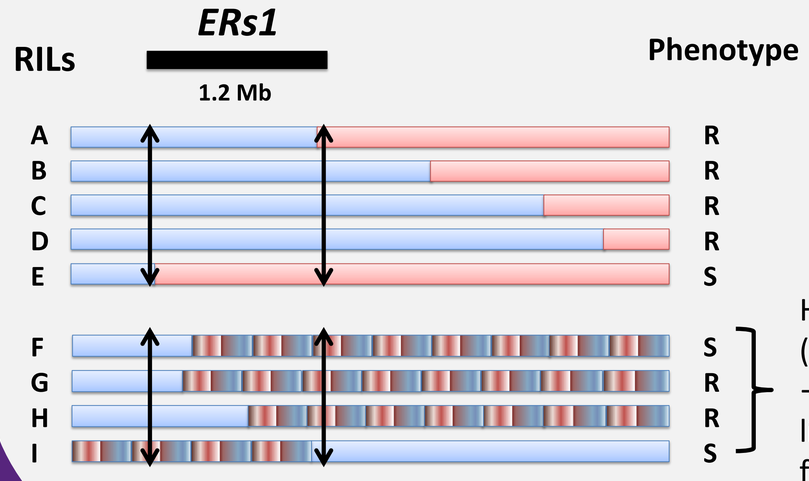
Results

- 14 linkage groups (661 SNPs, 136 AFLPs and 26 SSRs) anchored to the 12 chromosomes of eggplant's genome SME_r2.5.1 [5]



- QTL conferring resistance to phylotypes I, IIA and III strains Phenotypic variance (PVE): 13 to 38%
- QTL conferring resistance to phylotypes IIA and III strains PVE: 17 to 45%
- *ERs1* major resistance QTL conferring very high level of resistance to phylotypes I strains

- *ERs1* physical position estimated in a 1.2 Mb of the long arm of chromosome 9.



Conclusions

- **Presence of a major QTL (*ERs1*) specifically associated with resistance to phylotype I.**
  - ➢ Deployment of cultivars with *ERs1* in areas where phylotype I strains are predominant (Asia).
- **Two broad-spectrum QTLs on chromosomes 2 and 5.**
  - ➢ Introgression in commercial cultivars in combination with *ERs1* to confer resistance to phylotypes IIA and III.
- **Anchored map will help to fine map *ERs1* and potentially identify candidate genes.**
  - ➢ Better understanding of *R. solanacearum* and plants interactions.

References

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